FACT SHEET FOR NPDES PERMIT NO. WA0039616

SEH AMERICA, INC.

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INTRODUCTION

The Federal Clean Water Act (FCWA) (1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) of permits, which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of Chapter 90.48 Revised Code of Washington (RCW) which defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits [Chapters 173-220 and 173-216 Washington Administrative Code (WAC)], and water quality criteria for surface and ground waters (Chapters 173-201A and 173-200 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

This fact sheet has been reviewed by the Permittee and errors, in fact, have been corrected. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments (Appendix C) will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. Changes to the permit will be addressed in Appendix C.

GENERAL INFORMATION

Applicant:	Shin Etsu Handotai (SEH)	
Facility Name and Address:	SEH America, Inc. P.O. Box 8965 Vancouver, WA 98668-8965	
Type of Facility:	Electronic Crystals Manufacturing	
SIC Code:	3674	
Discharge Location:	(001)	Latitude: 45° 39' 06" N Burnt Bridge Creek Longitude: 122° 33' 24" W
	(002)	Latitude: 45° 39' 05" N Infiltration to Ground Longitude: 122° 32' 58" W
Water Body ID Number:	WA-28-1040	

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History of the Facility

Shin Etsu Handotai (SEH) is the world's largest supplier of silicon wafers to the semiconductor industry. SEH has major silicon wafer production facilities in Japan, Malaysia, Scotland, and here at the SEH America, Inc. facility in Vancouver, Washington. SEH America first received a NPDES permit in February 1985. The SEH America facility is currently under going a major expansion to increase production in order to meet growing U.S. market demands. Increased wastewater and stormwater flows from the expansion will be discharged to ground.

Industrial Processes

SEH America, Inc. manufactures silicon wafers from raw, ultra-pure silicon. The major steps in preparing clean, flat wafers include crystal growing, slicing, lapping, etching, polishing, and cleaning. Some silicon ingots from crystal growing are delivered to other wafer processing facilities in Japan and Malaysia. Most ingots are processed here at SEH America.

SEH's 4-, 5-, 6-, and 8-inch diameter polished silicon wafers are the substrate for integrated computer (IC) chips and other semiconductor devices. Some of the customers who manufacture these materials include IBM, Intel, and Motorola. These materials ultimately end up in a variety of electronic products such as computers, televisions, stereos, and automobiles.

CRYSTAL INGOT GROWING

The name "CZ" refers to the type of silicon crystal growing process at SEH America. At the beginning of this process, SEH uses acid chemical solutions to clean raw, ultra-pure polysilicon chunks in preparation for crystal growing furnaces. Inside the furnaces, the polysilicon and small quantities of dopant (typically elemental boron) are melted, and seed crystals placed on a hanging wire are used to "grow" silicon into single-crystalline silicon ingots (somewhat like melted wax collects onto wicks to make candles).

Once the ingot process is complete, ingots are removed from the furnaces and cooled. Cutting and grinding machines are used to remove "tails" and sample pieces, and grind the cylindrical surfaces into perfectly shaped ingots. Water-based cutting fluids are used in these machines.

Ingot samples from the cutting process are heat treated and dipped in various chemical solutions to highlight crystalline defects of the ingot. Inspection procedures determine whether to accept or reject ingots for further processing. The chemical baths contain diluted hydrofluoric acid, nitric acid, acetic acid, and chromic acid.

SLICING AND EDGE GRINDING

Ingots accepted for further processing are mounted onto guide beams and placed into slicing machines. Diamond-blade saws cut wafers from the ingots. Batches of wafers are placed into carriers and ran through a wafer cleaning bench containing baths of diluted acetic acid and sodium hydroxide.

Wafers are then processed through edge grinders, where smooth, beveled edges are formed to provide easier handling. Most silicon wafers are laser marked with identification codes.

The slicing machines and edge grinders both use water-based solutions for cutting fluids.

LAPPING

In the lapping process, wafers are placed into flat templates between large rotating metal plates. A slurry is used to remove a small layer of uneven silicon on the wafers caused from the slicing machines. Wafers are then cleaned in a bench containing diluted sodium hydroxide, ammonium hydroxide, and hydrogen peroxide baths.

ETCHING

Batches of wafers are dipped into a solution of hydrofluoric, nitric, and acetic acids to selectively etch away silicon from the wafers. The wafers are then rinsed and cleaned in a bench that contain baths of dilute sodium hydroxide, ammonium hydroxide, and hydrogen peroxide. These chemicals help remove very small metallic and other contaminants from the wafers. Wafers are then inspected for defects before further processing.

ANNEALING

All silicon wafers are placed in furnaces. The wafers are heated to temperatures of 600 degrees Celsius, in which the heat and subsequent cooling help set the desired conductive properties of silicon.

SILICON/SILICON OXIDE DEPOSITION

SEH uses various methods of depositing polycrystalline silicon onto the backsides of silicon wafers. The layers of silicon again provide desired conductive properties of the silicon wafer.

"Backside damage" refers to a method of blasting dry sand grit directly onto the back sides of wafers to form a thin layer of polysilicon.

"Low Pressure Chemical Vapor Deposition" (LPCVD) involves gaseous silane in a heated furnace to form layers of polysilicon onto batches of wafers.

"Atmospheric Pressure Chemical Vapor Deposition" (APCVD) involves a reaction between gaseous silane and oxygen in a furnace to produce a silicon oxide layer on the back sides of silicon wafers. The oxide layer provides a seal to protect the wafer during epitaxial silicon deposition (see below).

These process areas use cleanline benches that hold diluted hydrofluoric acid, ammonium hydroxide, sodium hydroxide, and hydrogen peroxide solutions for wafer cleaning and preparation.

POLISHING

In this final silicon stock removal step, wafers are cleaned, wax mounted onto glass plates, and placed on polishing machine tables where fine silica slurry solutions are used to provide smooth, flat surfaces on wafers. Methylene chloride, toluene, ammonium hydroxide, and isopropanol are chemicals used in this process area.

FINAL CLEANING AND PACKAGING

A two-stage cleaning process is used to remove organic, metallic, and particulate contaminants for silicon wafers. Batches of wafers are run through baths of hot water, sodium hydroxide, ammonium hydroxide, hydrogen peroxide, and then placed in isopropanol vapor dryers before inspection and packaging. Packaged wafers are sent to a warehouse for shipments to customers, or to the epitaxial (EPI) facility for further processing.

EPI

At the EPI facility, wafers are placed in heated furnaces where a very thin layer of "doped" silicon is deposited onto the top surfaces of polished wafers. Gaseous trichlorosilane, hydrogen, and diluted dopants (diborane, phosphine, arsine)* are used in the furnace to form the silicon layer. Also, hydrogen chloride and nitrogen are used in cleaning and purging steps of the epitaxial process.

The EPI process also uses cleanlines containing hydrofluoric acid, ammonium hydroxide, hydrochloric acid, hydrogen peroxide, and isopropanol for preparing and cleaning wafers.

Treatment Processes

All process wastewater generated at the existing facility is collected and eventually discharged to the sewage collection system of the City of Vancouver's westside wastewater treatment facility. The new SEH facility expansion will generate additional process wastewater that will be handled in the same manner as the existing process wastewater. Prior to discharge, most of the process wastewater flows through elementary neutralization tanks. Other wastewater flows through a fluoride removal system, solvent removal system, or sludge removal system. All wastewater that is discharged to the sewer must meet effluent discharge standards set by the City of Vancouver in accordance with its Department-approved pretreatment program. Process wastewater is discharged according to the requirements of an Industrial Pretreatment Permit Number 94-10, issued by the City of Vancouver. Therefore, the wastewater discharged to the sewer does not need to be covered by this NPDES permit.

The existing developed site discharges non-contact cooling water, reverse osmosis (RO) reject water, stormwater, and multimedia backwash water to a series of three ponds (outfall 001). Non-contact cooling water, RO reject water, stormwater, and filter backwash water that is generated by the new facility expansion will be discharged to a series of new ponds and ultimately into the ground (outfall 002) through an infiltration basin. These types of wastewater are relatively low in pollutants, and typically require very little treatment.

The ponds do provide quiescent conditions in which some sedimentation will occur. Some degree of temperature attenuation is also achieved in the ponds. Prior to discharge to the ponds, the stormwater is provided some pollution prevention through a number of best management practices (BMPs). SEH provides pollutant source control by regularly sweeping parking lots and regular inspections for potential stormwater pollutant sources. SEH has also installed trapped inlet catch basins which are regularly serviced. SEH also places oil absorbent materials in each catch basin to collect and remove oil and grease.

Discharge Outfall to Burnt Bridge Creek

The existing ponds (1, 2, and 3) discharge the combined non-contact cooling water, RO reject water, stormwater, and multimedia backwash water through about 1,500 feet of City-owned stormwater culvert to Peterson Ditch which is a tributary to Burnt Bridge Creek, a Class A waterbody. Peterson Ditch is a man-made waterway originally constructed for the purpose of storm and irrigation tailwater drainage from agricultural activities.

Ground Discharge Distribution System

The new facility will discharge combined non-contact cooling water, RO reject water, stormwater, and filter backwash water to what will be called pond 4. This pond has a contributing area for stormwater of about 46 acres; which is about 80 percent impervious surfaces. Modeling of

stormwater runoff to pond 4 indicates that a detention storage volume of 82,000 cubic feet is required to attenuate peak flows. The pond will have an approximate area of 1.5 acres and detention volume of 196,000 cubic feet.

All waters that make it in to pond 4 will drain to an infiltration basin. This basin is located adjacent to pond 4. The basin has an approximate area of 0.3 acres. It is situated in alluvial sands and gravel which have an extremely high infiltration rate. Geotechnical investigations of this area indicate that percolation rates range from 60 to 1,200 inches per hour.

As a back up system to the infiltration pond, four dry wells will begin to operate once the water surface elevation in the infiltration ponds reaches a preset overflow level. The infiltration system is designed such that either the infiltration basin or the drywell field can be taken off line for maintenance, or both taken off line for spill containment. The infiltration basin is designed with a filter fabric underneath 6 inches of sand to allow for the removal of sediments and system maintenance.

Ponds 1 and 4 are connected by a pipe to allow for flow balancing between the two outfalls. This connection is not a bypass.

PERMIT STATUS

An application for permit renewal was submitted to the Department on February 1, 1996, and supplemental information was received on March 27, 1996. The Department accepted the application on August 13, 1996.

The previous permit for this facility was issued on August 29, 1991. The previous permit placed effluent limitations on flow, pH, oil and grease, BOD_5 , TSS, chlorine residual, and temperature.

Table 1: Previous Permit Effluent Limitations for Outfall 001.

Parameter	Monthly Average	Daily Maximum
Flow (MGD)	1.2	3.9
pH (S.U.)	Within the range of 6.5 to 8.5	
Oil and Grease, Total (mg/L)	10	15
BOD_5 (mg/L)	N/A	30
TSS (mg/L)	10	30
Chlorine, Total Residual (mg/L)	N/A	0.1
Temperature (°F)	N/A	65 (18°C)

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an inspection on October 18, 1995.

SEH America has maintained compliance with the previous permit conditions with the exception of the average flow limitations. The average flow limitation was violated because of exceptional amounts of rainfall in the month of December 1995.

Because of good performance in the existing pond system, the frequency of BOD_5 and oil and grease monitoring was reduced from weekly to monthly in the permit modification effective August 10, 1994.

The previous permit required SEH to maintain a healthy population of game fish (trout were chosen) in the pond system. SEH was to report of any significant (greater than twenty percent) fish kills in the ponds. There have been no significant or unusual fish kills in the ponds.

WASTEWATER CHARACTERIZATION

The wastewater discharge, both to surface water and to the ground, is characterized for the following regulated parameters:

Table 2: Wastewater Characterization.

Parameter	Concentration or value
pH	6.8 to 8.2
Conductivity	234
Total Dissolved Solids (TDS)	182 mg/L
BOD_5	<3.7 mg/L
TSS	<3.0 mg/L
Ammonia (as N)	<0.05 mg/L
Temperature (winter average)	12.6 °C (54.7 °F)
Temperature (summer average)	15.4 °C (59.7 °F)
Chlorine, Total Residual	0.028 mg/L
Fecal Coliform	23 MPN/100 mL
Fluoride	0.9 mg/L
Nitrate (as N)	3.3 mg/L
Nitrogen, Total Organic (as N)	0.6 mg/L
Oil and Grease	<1.3 mg/L
Phosphorus, Total (as P)	0.5 mg/L
Sulfate (as SO_4)	8.9 mg/L
Sulfide (as S)	0.13 mg/L
Calcium	23.5 mg/L
Magnesium	9.4 mg/L
Sodium	9.2 mg/L
Potassium	3.4 mg/L
Chloride	5.6 mg/L
Copper	8 µg/L
Iron	419 µg/L
Manganese	98 µg/L
Zinc	17 µg/L

The toxic pollutants arsenic, cadmium, chromium, lead, nickel, selenium, and silver were tested for, but not detected, in the effluent at the method detection limits of approved analytical methods.

PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific wastewater. Technology-based limitations are set by regulation or developed on a case-by-case basis [40 Code of Federal Regulations (CFR) 125.3, and Chapter 173-220 WAC]. Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC) or Sediment Quality Standards (Chapter 173-204 WAC). The more stringent of these two limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Federal categorical effluent limitations or guidelines have not been established for non-contact cooling water, RO reject water, stormwater, or multimedia backwash water that comes from semiconductor manufacturing operations. Therefore, the technology-based effluent limitations will be based on past performance of the SEH America facility and the permit writer's best professional judgment (BPJ). The proposed technology-based effluent limitations for discharge to Burnt Bridge Creek via outfall 001 will be as follows:

Table 3: Technology-based Effluent Limitations.

Parameter	Monthly Average	Daily Maximum
pH (S.U.)	Within the range of 6.5 to 8.5	
Oil and Grease, Total (mg/L)	10	15
BOD_5 (mg/L)	N/A	30
TSS (mg/L)	10	30
Chlorine, Total Residual (mg/L)	N/A	0.1
Temperature (°C)	N/A	18

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

> "Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the

wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington state (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

Antidegradation

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070 and -200-030.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a degradation of existing water quality or beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Description of the Receiving Water

The facility discharges to Burnt Bridge Creek via a City-owned storm sewer and Peterson Ditch. Burnt Bridge Creek is designated as a Class A freshwater receiving stream in the vicinity were Peterson Ditch empties into Burnt Bridge Creek. Significant nearby non-point sources of pollutants include the Royal Oaks Golf Course, which Burnt Bridge Creek must flow through before reaching the confluence with Peterson Ditch. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

Surface Water Quality Criteria

Applicable criteria are defined in chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Table 4: Surface Water Quality Criteria.

Parameter	Criteria
Fecal Coliforms	100 colonies/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts

Consideration of Surface Water Quality-Based Effluent Limitations

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The evaluation of the need for surface water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for Burnt Bridge Creek is the seven-day average low river flow with a recurrence interval of ten years (7Q10). The ambient background data used for this permit includes the following from receiving water testing conducted by SEH America on January 18, 1996:

Table 5: Ambient Surface Water Data.

Parameter	Value used
7Q10 low flow	11 cfs
Velocity	2.07 ft/sec
Depth	0.69 feet
Width	8.0 feet
Roughness (Manning)	n=0.035
Slope	0.005 (0.29 degrees)
Temperature (summer)	22 °C
pH	7.55
BOD_5	<4.0 mg/L

Parameter	Value used
TSS	9.0 mg/L
Dissolved Oxygen	11.4 mg/L
Total Ammonia-N	<0.05 mg/L
Conductivity	170
Hardness	59.4 mg/L as CaCO3
Zinc	12 µg/L (total recoverable)
All Other Metals	0.0 (below detection limits)

The impacts of dissolved oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, and other toxics were determined as shown below, at the critical conditions described above.

BOD--The effluent is extremely dilute with respect to BOD. This means that under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitation for BOD was placed in the permit.

Temperature and pH--Receiving water monitoring conducted by SEH has shown that the discharge from the facility actually cools the stream in the summer months when the ambient stream temperature rises above 18 °C. Under critical conditions there has been no demonstrated violation of the Water Quality Standards for Surface Waters for temperature or pH. Therefore, the technology-based effluent limitations for temperature and pH were placed in the permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: minor amounts of chlorine, copper, and zinc. Valid ambient background data was available for dissolved oxygen, pH, temperature, hardness, TSS, copper, and zinc. It is the permit writer's best professional judgment that the amounts of chlorine, copper, and zinc in the discharge are insignificant and do not have a reasonable potential to cause a violation of Water Quality Standards for Surface Waters. This determination assumes that the Permittee meets the other effluent limits of this permit.

There is additional evidence that the effluent being discharged to Burnt Bridge Creek is of relatively high quality. The previous permit required SEH to maintain a healthy population of game fish (trout were chosen) in the pond system. SEH was to report of any significant (greater than 20 percent) fish kills in the ponds. There have been no significant or unusual fish kills in the ponds during the term of the previous permit.

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

The WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water acute toxicity, and the Permittee will not be given an acute WET limit and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that acute toxicity has not increased in the effluent.

The WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water chronic toxicity, and the Permittee will not be given a chronic WET limit and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that chronic toxicity has not increased in the effluent.

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted for submission with a permit application fails to meet the performance standards in WAC 173-205-020, "whole effluent toxicity performance standard." The Permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional WET testing after the time the process or material changes have been made.

Human Health

The Department has determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's groundwaters, including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. Drinking water is the beneficial use generally requiring the highest quality of groundwater. Providing protection to the level of drinking water standards will protect a great variety of existing and future beneficial uses.

Description of the Receiving Ground Water Subsurface Conditions

Field observations at the new facility expansion site indicate that the principal drainage mechanism is the ponding and infiltration of rain water. Published permeability rates for Lauren series range from 0.63 to 2.0 inches per hour, or 15.1 to 48.0 inches per day (USDA-SCS, 1972). To get these rates in perspective relative to rainfall depths, the 100-year storm, 24-hour rainfall depth (amount of rain expected in a 24-hour storm once very 100 years) is about 4.5 inches for the area of Clark County where the facility is located. Comparing the soil permeability to the 100-year, 24-hour rainfall, this soil has the ability to pass from three to ten times more than the amount of water expected from this infrequent storm event.

Much of the incident rainwater infiltrating into the soil eventually percolates into the groundwater aquifer. Geotechnical investigations state that the subsurface materials are Pleistocene alluvial deposits of cobbles, gravel, sand, silt, and clay. The alluvium ranges from loose to hard or slightly cemented (GRI, 1991).

The direction of the regional groundwater flow is reported to from northeast to southwest (i.e., toward and in the same direction of flow as the Columbia River). Soil borings indicate that the soil is highly lenticular which can create small perched aquifers. These perched aquifers are recharged primarily by rainfall infiltration, and therefore, fluctuate seasonally (GRI, 1991).

There have been numerous test pits and borings performed on both the existing and the new facility expansion sites. Groundwater was encountered at depths ranging from 3.5 to 45 feet from the ground surface. The corresponding groundwater surface elevations range from 157 to 198 feet (GRI, 1991).

Subsurface infiltrometer tests performed in bore holes showed percolation rates from 120 to 1,200 inches per hour. Tests performed in larger pits were measured to range from 21 to 133 inches per hour. Well tests indicate the subsurface aquifer permeability is 638 inches per hour (GRI, 1991).

Test Pit Number 7, excavated by GRI in November 1990, is within the vicinity of the proposed infiltration basin that has been constructed to handle the non-contact cooling water, RO reject water, stormwater, and multimedia backwash water from the new facility expansion. At a depth of 6 feet to 12.5 feet, dense, gray gravel and cobbles with some sand were encountered; from 12.5 to 15.5 feet,

dense, coarse gray sand was encountered. Groundwater seepage was not encountered (GRI, 1991). These results indicate that this site should be well suited for an infiltration facility.

On the site of the new expansion, there are two old privately owned wells which are not used and have been capped. These wells were used by previous homeowners for domestic and/or agricultural purposes.

On the existing site, there are a total of eight monitoring wells. The wells are primarily located around the perimeter of the existing facility with two wells in the interior of the existing site. The purpose of the wells is to monitor groundwater quality on the existing site. On a periodic basis, samples are drawn from the wells and analyzed in accordance with EPA methods.

It should be pointed out that none of the monitoring wells on the existing site are on the site of the new facility expansion. Two of the wells are located to the northern side of the new site, but the data from those wells is not considered representative of the background groundwater quality because they do not appear to be close enough to the upgradient zone of the infiltration basin. These two wells, and the data from them, may be used for groundwater monitoring at the new site if SEH can demonstrate that they are appropriately designed and located.

Ground Water Quality Criteria

Applicable ground water criteria as defined in Chapter 173-200 WAC and in RCW 90.48.520 for this discharge include the following:

Table 6: Ground Water Quality Criteria.

Parameter	Criteria
Total Coliform Bacteria	1 Colony/ 100 mL
Total Dissolved Solids (TDS)	500 mg/L
Chloride	250 mg/L
Sulfate	250 mg/L
Nitrate	10 mg/L
pH	6.5 to 8.5 standard units
Iron	300 μg/L
Manganese	50 μg/L
Toxics	No toxics in toxic amounts

Consideration of Ground Water Quality-Based Effluent Limitations

Most of the wastewater constituents will be at levels below the groundwater criteria prior to being discharged to the infiltration basin. Iron and manganese are present in elevated concentrations due to the high concentrations contained in the source water. Iron, manganese, and fecal coliform are projected to be at concentrations greater than the criteria. However, additional treatment will occur in the infiltration basin and in the vadose zone prior to reaching groundwater. Positively charged particles, such as cations, metals, and bacteria, will be attenuated by the negatively charged soil particles. It is anticipated that iron, manganese, and fecal coliform will be treated to levels below the criteria prior to reaching groundwater.

Background water quality is not well defined for this facility. The permit requires that groundwater monitor wells be installed and that a groundwater monitoring program be developed. During the initial sampling, background water quality and compliance with the groundwater quality standards will be determined. If compliance with the groundwater standards cannot be achieved, then additional treatment will be required. A compliance schedule will be developed, if needed, to assure long-term compliance and groundwater protection.

No valid upgradient background data were available for coliform bacteria, TDS, chloride, sulfate, nitrate, pH, iron, or manganese. The proposed permit requires the Permittee to submit a monitoring well location and design plan, and a groundwater monitoring plan. Monitoring wells will be required at upgradient and downgradient locations on the new site to collect background concentrations, and to monitor for any changes in groundwater quality near the point of discharge. This information may result in a permit modification or limits in the next renewal.

PROPOSED EFFLUENT LIMITATIONS

The following table contains the proposed effluent limitations for the existing outfall 001 to Burnt Bridge Creek. These effluent limitations are all technology-based which the Department has determined to be AKART. The only change in these limitations from the existing permit is that the flow limitation has been eliminated. The Department has determined that the predicted maximum and average flows from SEH do not have the potential to adversely impact Burnt Bridge Creek, and that there is no environmental benefit to setting a control limit on the volume of water discharged. This decision was reached only after obtaining a consensus from the City of Vancouver, which oversees and sets controls on the hydraulic input to the creek.

Table 7: Proposed Effluent Limitations for Outfall 001.

Parameter	Monthly Average	Daily Maximum
pH (S.U.)	Within the range of 6.5 to 8.5	
Oil and Grease, Total (mg/L)	10	15
BOD_5 (mg/L)	N/A	30
TSS (mg/L)	10	30
Chlorine, Total Residual (mg/L)	N/A	0.1
Temperature (°C)	N/A	18

The following table contains the proposed effluent limitations for the proposed new outfall 002 to ground. These effluent limitations are all technology-based which the Department has determined to be AKART.

Table 8: Proposed Effluent Limitations for Outfall 002.

Parameter	Monthly Average	Daily Maximum
pH (S.U.)	Within the range of 6.5 to 8.5	
Oil and Grease, Total (mg/L)	10	15
BOD_5 (mg/L)	N/A	30
TSS (mg/L)	10	30
Chlorine, Total Residual (mg/L)	N/A	0.1

MONITORING AND REPORTING

Effluent monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the pond system and pollution prevention measures are functioning correctly and the effluent limitations are being achieved.

The monitoring and testing schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

OTHER PERMIT CONDITIONS

MONITORING WELL LOCATION AND DESIGN PROPOSAL

SEH America will be required to submit a monitoring well location and design proposal to the Department within 90 days of the effective date of the permit. The proposal will contain what SEH believes to be the optimal location and design for monitoring wells in order obtain the most representative upgradient and downgradient groundwater quality data. The Department must approve the proposal prior to the construction of the wells.

GROUNDWATER MONITORING PLAN

A groundwater monitoring plan will need to be developed which describes SEH's proposal for assessing future impacts to groundwater quality. This plan will describe how the monitoring wells will be used. The plan will include a monitoring schedule, sample collection procedures, and will specify which pollutants will be monitored. The Department should be consulted for guidance on the content of the plan. The Department must approve the plan prior to its implementation. The monitoring plan will become an enforceable part of the permit after it has been approved. The plan must be submitted to the Department within 120 days of the permit effective date.

CONTINGENCY PLAN

A contingency plan must be developed which examines the corrective or mitigative action SEH will be prepared to take if future groundwater monitoring indicates that groundwater quality is being negatively impacted by the new ground discharge. Corrective or mitigative measures may be required if any beneficial uses of groundwater are impaired by the discharge. The contingency plan must be submitted within 270 days of the permit effective date.

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the Permittee to update this plan and submit it to the Department.

SOLID WASTE PLAN

The Department has determined that the Permittee has a potential to cause pollution of the waters of the state from leachate of solid waste.

This proposed permit requires, under the authority of RCW 90.48.080, that the Permittee update the solid waste plan designed to prevent solid waste from causing pollution of the waters of the state. The plan must be submitted to the local permitting agency for approval, if necessary, and to the Department.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit have a duration not to exceed June 30, 1998, the end of the permit cycle for Basin 5. The Department normally proposes to issue permits for the regulatory maximum duration of five years, but the Department is tying to get all of the permits in Basin 5 to have the same issuance and expiration date. This permit is proposed to have a shorter than normal initial duration, and then be reissued by June 30, 1998, for a normal duration of five years.

REVIEW BY THE PERMITTEE

A proposed permit and fact sheet was reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit and fact sheet.

REFERENCES FOR TEXT AND APPENDICES

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Summary of Subsurface Conditions at SEH America, Inc. Site, Vancouver, Washington. Geotechnical Resources, Inc. (GRI).

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C. Tsivoglou, E.C., and J.R. Wallace.

1972. Soil Survey of Clark County, Washington. United States Department of Agriculture, Soil Conservation Services (USDA-SCS). Washington D.C.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.) Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on September 8, 1996, in *The Columbian* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on January 30, 1997, in *The Columbian* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m., and 5:00 p.m., weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30-day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within 30 days from the date of PNOD indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by contacting Carl Tonge at (360) 407-6288, or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Class 1 Inspection--A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection--A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Daily Maximum Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (chapter 173-201A WAC).

Monthly Average --The average of the measured values obtained over a calendar month's time.

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--RESPONSE TO COMMENTS

RESPONSE TO COMMENTS
RECEIVED DURING THE PUBLIC COMMENT PERIOD

(for National Pollutant Discharge Elimination System (NPDES) Permit No. WA0039616)

The Department of Ecology (Ecology) has completed drafting the NPDES permit for SEH America, Vancouver, Washington. Comments were accepted on the draft permit for a 30-day period. At the close of the public comment period (March 1, 1997), Ecology had received comments from the following interested party:

> Mr. Steve Saunders, Surface and Ground Water Quality Management Unit, Water Quality Program, Department of Ecology, Olympia, Washington

After a review of those comments, the permit and fact sheet have been revised as appropriate. This response to comments document is intended to reflect substantive comments and concerns on the proposed permit that were raised in the public comment period. The comments as they appear below have been paraphrased for clarity. The complete and unedited version of all the comments as they were received by Ecology will be kept in the public file, and are available during regular business hours for review. A summary of Ecology's response to the comments is provided below:

Response to Comments from Mr. Steve Saunders, Department of Ecology:

1. Comment:

The use of Aquashade® for controlling aquatic plants and algae in the site stormwater ponds should be permitted through the NPDES permit program. SEH has just recently submitted a report titled Aquashade® Biological Monitoring Study and Literature Review (January 13, 1997), prepared by CH2M HILL for SEH America, Inc. This study was undertaken by SEH in order to assess the appropriateness of using Aquashade® for controlling aquatic plants and algae in the site stormwater ponds.

I believe the correct mechanism for approving the use of this product at the SEH site would be to include the appropriate provisions in SEH's NPDES permit. This would be consistent with the Department's strategy of phasing out the use of short-term modifications (orders) by incorporating the provisions authorizing these activities into new or existing permits specifically authorized by RCW 90.48. Based on the results of the report, I recommend a discharge limit be imposed such that concentrations at the discharge point to Peterson's ditch do not exceed 0.5 mg/l. This limitation is necessary to protect the aquatic biota in Peterson's ditch from unintended impacts. SEH should be required to monitor for Aquashade® concentrations at this site several times a week when treating the stormwater ponds.

Response:

The permit writer has reviewed the Aquashade® report, and concurs with Mr. Saunders' conclusions and recommendations. Aquashade® is not directly toxic, but controls the growth of aquatic plants and algae indirectly by reducing the amount of light available to the aquatic plants and algae for photosynthesis. The Department recognizes the real need for an economical and effective means to control the growth of aquatic plants and algae in the ponds so that the ponds will continue to

function properly through the summer months. The use of Aquashade® should not threaten the aquatic biota in Burnt Bridge Creek provided the above mentioned controls are placed in the permit.

Action Taken:

A discharge limit 0.5 mg/l will be placed in the permit to control the concentrations that reach Peterson's Ditch, and ultimately, Burnt Bridge Creek. SEH will be required to monitor for Aquashade® concentrations at the overflow to the Peterson Ditch storm drain several times per week when treating the stormwater ponds with Aquashade®.